STEM Spotlight

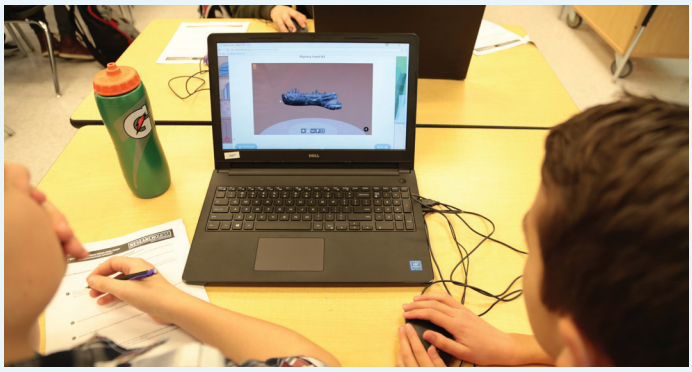
Natural History Museum of Utah

HELPS STUDENTS STATEWIDE LEARN CRITICAL THINKING SKILLS

The Natural History Museum of Utah (NHMU) wants all students statewide to have the opportunity to explore their museum; however, many students live too far away or lack the resources to come each year.

For more than 50 years, NMHU has worked to support students and teachers providing many valuable face-to-face programs. In 2013, NMHU received funding to create a program that would teach students statewide critical thinking skills using new technologies. The program, Research Quest, is an online program accessible to all Utah teachers that leverages the Museum's incredible research collection with 3D and game technologies.

"We were quite fortunate to have funding partners who gave us the time to take a design research approach to the development of Research Quest," said Madlyn Runburg, director of education initiatives at the Natural History Museum of Utah. "Often, museums receive funds to create engaging new programs without the support to also study the work along the way. From the start, we knew we wanted to be able to measure the learning taking place through the use of Research Quest - a complicated and time consuming endeavor."



Students use the Natural History Museum of Utah's Research Quest program.

In the fall of 2013, Runburg and the NHMU team approached the National Advisory Committee with several concept programs and finally settled on the creation of a 3D web-based program, where they would scan museum artifacts to give students statewide the opportunity to explore, investigate and use problem solving skills.

In 2014, NMHU tested prototypes of the program concept on iPads in four urban and four rural sixth grade classes."

"The response was overwhelmingly positive," Runburg said. "Students and teachers loved the concept."

After completing substantial learning research to inform the design of the program, the online version went live during the 2015-2016 school year, where NHMU tested it, and then revised it in the summer of 2016. In the 2016-2017 school year, they completed the last round of tests on the final version of their pilot investigations.

"Research Quest is a great tool when it comes to helping your students think and act like scientists," said Jennifer Mackay, a seventh grade teacher at Riverview Junior High School. "It is aligned with the new SEEd standards. By completing Research Quest students have the opportunity to be engaged with all the cross-cutting concepts. I would use it yearly in my teaching."

The finished product is now accessible online to all teachers in the state, and contains a catalogue of three investigations where students can explore virtual 3D models of dinosaur

and make claims based on observable evidence.

"It's about students engaging in an authentic experience," Runburg said. "Students work with the same evidence as our scientists. Through these learning experiences, students are encouraged not to think about right and wrong answers. Instead, we ask them to think about whether or not particular answers are strongly supported by evidence or not. This is a way of thinking we know will serve them in these investigations and as they work through other learning situations where they are asked to effectively reason."

The three investigations meet SEEd standards and with the development of new science standards, these investigations offer educators another tool to give their students engaging experiences.

"It's very scalable, teachers don't have to vie for us to come out and visit, they can use this program at their will," Runburg said. "It's exciting to see."

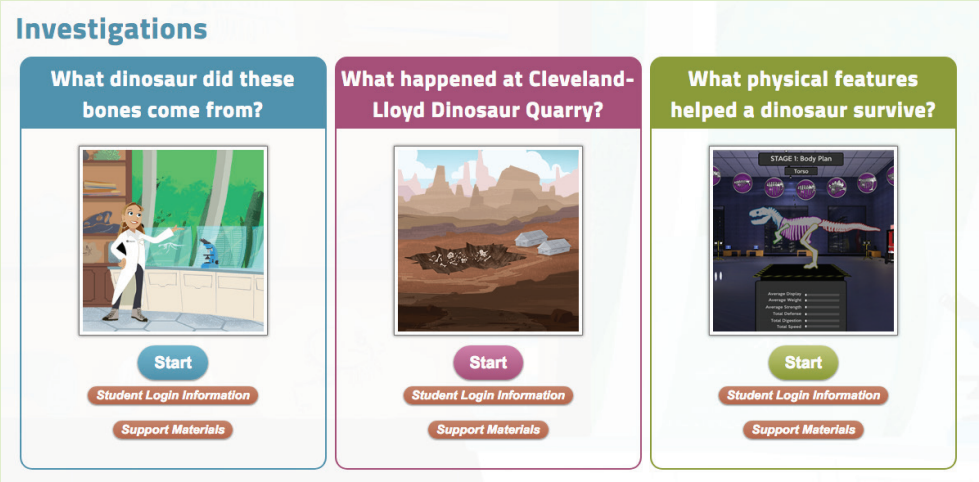
Fifty six teachers were surveyed who used the online program independently (without in-person assistance from NHMU) and nearly 100 percent of the feedback received says students were engaged, enjoyed collaborating with their peers, and that teachers would definitely use the program again in their classroom.

"I loved using Research Quest in my English and language arts classroom," said Christine Edenfield, a seventh grade teacher at Springville Junior High School. "The quests challenged students to think critically, and analyze data in a very engaging way. These skills were transferred to their writing, and they became better at arguing and elaborating."

You can access Research Quest at www.researchquest.org and create a free account today. Questions about Research Quest? Contact Madlyn at mrunburg@nhmu.utah.edu.

Synthesis of 2016-2017 School Year Testing

Our evaluation work last year showed us that students who used the investigations in Research Quest performed significantly better than the control classes they were compared with. Specifically, they were able to develop a high-level, generalizable understanding of critical thinking – underpinning the STEM practices outlined in the standards. They were also better able to evaluate questions that build meaningful evidence for arguments and developed transferrable knowledge about the evaluation of evidence-based arguments. Finally, we found evidence that students who used Research Quest developed knowledge they could generalize and transfer to other learning situations.



Screenshots from the Natural History Museum of Utah's Research Quest Program. Feedback from teachers and students on effectiveness and engagement have been overwhelmingly positive.